

cleus and an external spherical shell are in a state of dilatation, and that a shell intermediate between them is in a state of contraction; that its structure and optical properties are not alike in all directions, but have reference to the axis of vision; and that its peculiar structure probably is necessary for correcting spherical aberration.

*Some farther Account of the Fossil Remains of an Animal, of which a Description was given to the Society in 1814. By Sir Everard Home, Bart. V.P.R.S. Read June 13, 1816. [Phil. Trans. 1816, p. 318.]*

The present descriptions are taken from specimens in the collection of Mr. Buckland of Oxford, and Mr. Johnson of Bristol, and are thought to determine the class to which this animal belongs.

The structure of the vertebræ, as shown in the author's former paper, made it evident that the progressive motion of the animal resembled that of fishes; but at that time neither the scapula in its perfect state had been seen, nor had the bones of the pectoral fin been found, which now make it clear that all the bones correspond with those of fishes, but differ essentially from those of land animals.

In all animals that breathe by means of lungs, the ribs are articulated both to the bodies and to the transverse processes of the vertebræ, so as to admit of expansion of the chest; but the ribs of fishes which solely give defence to the viscera, have only one insertion, being connected solely with the bodies of the vertebræ, midway between their two articulating surfaces, so as not to interfere with the motion of the vertebræ on each other, as is the case in land animals.

The author observes, that the ribs in this animal are placed in all respects like those of fish.

In the whale tribe the scapula and bones of the fore fin resemble those of the crocodile, and they bear a close analogy to those of land animals in general; but in this animal these bones, it is observed, resemble those of the shark.

It is remarked also, that the bones in the young state have epiphyses, as is the case with the bones of fish generally. The ribs also appear to have been soft like those of fish, as we may judge from the grooved or fluted form, they have assumed by compression.

But though, from consideration of all these circumstances, Sir Everard Home has no doubt that this animal was a fish, he admits that the long projecting snout and conical teeth show a marked difference between this animal and any now in existence, and may occasion a difficulty in arranging it with any class of known animals.

*Farther Observations on the Feet of Animals whose progressive Motion can be carried on against Gravity. By Sir Everard Home, Bart. V.P.R.S. Read June 27, 1816. [Phil. Trans. 1816, p. 322.]*

Since the author's former observations on this subject were communicated to the Society, he has been enabled, by the assistance of

Mr. Bauer, to correct his former representations of the structure of the feet of the *Lacerta Gecko* and House Fly, and also to add an account of a similar mechanism in other insects delineated by the same skilful artist.

In the Blue-bottle Fly the suckers are two on each foot, immediately under the root of each claw. Their form is funnel-shaped, with a narrow neck; when not in use they are contracted, and approaching each other lie together in the space between the claws; but when prepared for action they are expanded, and they separate laterally from each other.

In the Horse Fly (the *Tabanus* of Fabricius,) the suckers differ from the former only in number, as there are three on each foot.

In the yellow Saw Fly (the *Cimbex lutea* of Fabricius,) suckers are found at each of the four joints of the toes, one at every joint.

In the *Dytiscus marginalis*, or Great Water Beetle, although for the common purpose of locomotion there is no such apparatus observable at the parts of the feet used in walking, the male is nevertheless abundantly furnished with suckers in the three first joints of the first and second pair of feet; and the purpose to which they are applied is that of embracing the female, who does not want, and is not provided with a similar mechanism. In the male those joints that are furnished with suckers, are of uncommon breadth, having the whole under surface covered with small suckers, to each of which is a small tubular neck.

In addition to the foregoing observations on the suckers by which insects attach themselves to different objects, the author also takes occasion to notice another peculiarity in the feet of some insects, as security against the injury they might sustain in alighting suddenly with considerable velocity.

In some species of *Grylli* and *Locustæ* the feet have on their under side globular cushions filled with a fibrous substance, and possessed of considerable elasticity.

In the *Locusta varia* there are three pair of cushions, of different sizes, at the three first joints of each leg.

But in fleas, which the author examined under an expectation of finding a similar structure, nothing of this sort is to be found; from which it would appear that such a provision is not wanted for resisting the momentum of so light a body, notwithstanding the great distance to which it leaps.

*A new Demonstration of the Binomial Theorem.* By Thomas Knight, Esq. Communicated by W. H. Wollaston, M.D. Sec. R.S. Read July 4, 1816. [*Phil. Trans.* 1816, p. 331.]

*On the Fluents of irrational Functions.* By Edward Ffrench Bromhead, Esq. M.A. Communicated by J. F. W. Herschel, Esq. F.R.S. Read June 4, 1816. [*Phil. Trans.* 1816, p. 335.]